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Conference Abstract

Slow Science for a Sustainable Agriculture

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Abstract

“Data is the lifeblood of decision-making and the raw material for accountability.” (Food and Agricultural Organisation of the United Nations)

Agriculture depends on living organisms: the resources that we grow and harvest (crops, livestock), the many naturally-occurring organisms that support agro-ecosystem services and those that are considered pests. Biodiversity represents the pool of resources upon which production systems are based. This ecosystem-based understanding of agriculture is fast replacing the simplistic input-output paradigm that was once prevalent. Reflecting this trend, the Food and Agricultural Organisation of the United Nations created a Department of Climate, Biodiversity, Land and Water in 2016. This shift is also perceived in trends in research supporting agriculture, where research towards fast fixes (eg. genetic engineering) for food security and production sustainability, is steadily losing ground to more systemic approaches and “Slow Science”. This includes information derived from observation-based, long-term, multi-location data gathering from, for example, newly-termed Living Laboratories or Genomic Observatories. These activities generate a diverse set of data types complemented with extensive physical-chemical and climate data to enable more comprehensive and scientifically defensible assessments of biodiversity for policy and regulatory decision-making. However, the data associated with these entities can be very large, raising several challenges. First, a robust IT infrastructure must exist and persist to both store the data and to facilitate analysis often associated with high-performance computing. Next, this infrastructure must be supported by a data management policy, which responsibly dictates what data is preserved and for what time period as most institutions must be cognisant of their limited IT resources. The data, where

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not sensitive, must typically be openly shared to allow for use in other projects from local to global scale. This sharing relies on global data standards managed by a multitude of standard bodies and spread across a diverse set of data types. However, this new paradigm, especially with the constant advent of new technologies such as those implemented in genomic observatories and precision agriculture, has challenged standards bodies to keep up. Another challenge lies in the analysis and management of this big data, which relies on a new set of skills not traditionally found in agricultural science including data scientists and data curators. Finally, a major challenge to this “Slow Science” approach are the research funding models themselves that are not highly supportive of long-term, and often non-hypothesis-driven research. We will discuss these challenges and provide some examples of progress being made to embrace this new “Slow Science” agricultural paradigm.

Keywords

agriculture, biodiversity, data, ecosystem

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